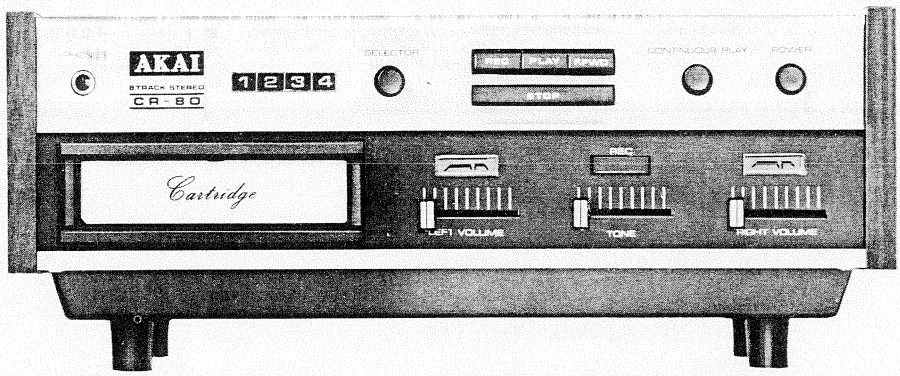
SERVICE MANUAL

AKAI CARTRIDGE TAPE RECORDER

MODEL CR-80

ALSO APPLICABLE FOR MODEL CR-80D



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I. SPECIFICATIONS

WEIGHT : 8.9 Kg (19.6 lbs.)
DIMENSIONS : 345(W) x 250(D) x 135(H) mm (13-1/2(W) x 10(D) x 5-1/2(H) inches)
POWER SUPPLY : AC 100 V to 240 V ; 50/60 Hz
RECORDING SYSTEM : In-Line 8-Track stereo recording
PLAYBACK SYSTEM : In-Line 8-track stereo playback
TAPE SPEED : Play : 3-3/4 ips.
Fast Forward : 15 ips.
TAPE SPEED DEVIATION : ±3%
WOW AND FLUTTER : Less than 0.35% rms.
FREQUENCY RESPONSE : 50 to 16,000 Hz (50 Hz ± 5 dB)
(16 kHz – 6 dB)
SIGNAL TO NOISE RATIO : Better than 42 dB
DISTORTION : Within 4% at 1,000 Hz 0 VU
CROSS-TALK : Less than –40 dB
ERASE RATIO : Less than –60 dB
INSULATION RESISTANCE : More than 50 M Ohms
INSULATION DURABILITY : 1,000 V AC for more than one minute duration
OUTPUT
LINE OUTPUT : 1.23 V (0 VU) ± 1.5 dB using 500 Hz 0 VU recorded tape
(Required load impedance more than 25 K Ohms)
DIN OUTPUT : 0.4 V (required load impedance more than 50 K Ohms)
MAIN OUTPUT : More than 7 W (Impedance 8 Ohms)
INPUT
LINE INPUT : 50 mV (Impedance 180 K Ohms)
DIN INPUT : 10 mV (Impedance 30 K Ohms)
MIC INPUT : 0.5 mV (Impedance 4.7 K Ohms)
MOTOR : Condenser starting induction two-speed (2–8 pole) motor.
Condenser Capacity : 4 μF (50 Hz) ; 2.5 μF (60 Hz)
Revolutions : 2900 to 725 rpm (50 Hz)
3480 to 870 rpm (60 Hz)
RECORD/PLAYBACK HEAD : In-Line 8-track stereo
Gap : 1/1000 mm
Impedance : 750 Ohms ± 15% at 1 kHz
ERASE HEAD : In-Line 8-track stereo
Gap : 0.1 mm
Impedance : 210 Ohms ± 10% at 90 kHz
OSCILLATION FREQUENCY : 65 kHz ± 5%

TRANSISTORS USED : 4 2SC693FU
4 2SC711 (D)
2 2SC971 (2) (3)
1 2SC1061 (A) (B) (C)
1 2SC968 (4)
IC USED : 2 AA072D
2 STK-011A
SILICON DIODES USED : 5 10D1. 1 10DC 1 (Red), 1 10DC1 (B1k), 1 10D4

II. MEASURING METHOD

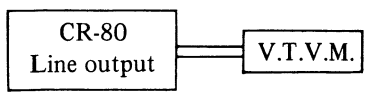
TAPE SPEED DEVIATION

1. Method involving use of pre-recorded tape.
Playback on the tape recorder to be tested a tape pre-recorded at 1,000 Hz ± 0.1% for measuring tape speed deviation. Connect the appropriate output to a frequency counter meter in order to measure the tape speed deviation from the deviation of the measured frequency.

WOW AND FLUTTER

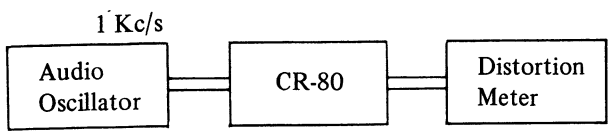
Playback a 3,000 Hz pre-recorded tape of which the wow and flutter level is guaranteed to be smaller than 0.07% for measurement by means of a wow meter. It is also possible for a 3,000 Hz sine wave to be recorded and played for measurement by means of the wow meter. In this case, however, the wow meter indicates a value as much as twice the value given in the specification on the first page.

SIGNAL TO NOISE RATIO



Playback a tape containing a 1,000 Hz sine wave recorded at "0" VU level on a standard recorder. Connect a V.T.V.M. to the line output jack of the recorder and measure its output.
Then remove the tape and measure the noise level under the same condition. Convert each of the measured values into decibels.

TOTAL HARMONIC DISTORTION FACTOR



Connect the measuring instrument as shown above, and record the 1,000 Hz sine wave at "0" VU. Playback the resultant signal and measure the overall distortion factor. Measure the noise level of the tape recorder with the tape removed ; connect the audio oscillator directly to the distortion meter for measurement of the distortion factor of the oscillator.
The required distortion factor may be obtained from the results of the above measurement by the following formula.

$$d_0 = d - d_1 - d_2$$

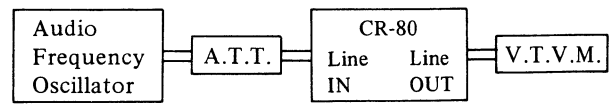
where, d_0 = Required
d = Overall distortion factor
d_1 = Noise level
d_2 = Distortion factor of the oscillator

(Note : New tape of particularly good quality should be used for measurement of the distortion factor.)

POWER OUTPUT

Playback a tape containing a sine wave of 500 Hz recorded at 0 VU on a standard recorder.
Connect a V.T.V.M. to the line output jack of the recorder and measure the voltage at the output of the recorder to be tested.

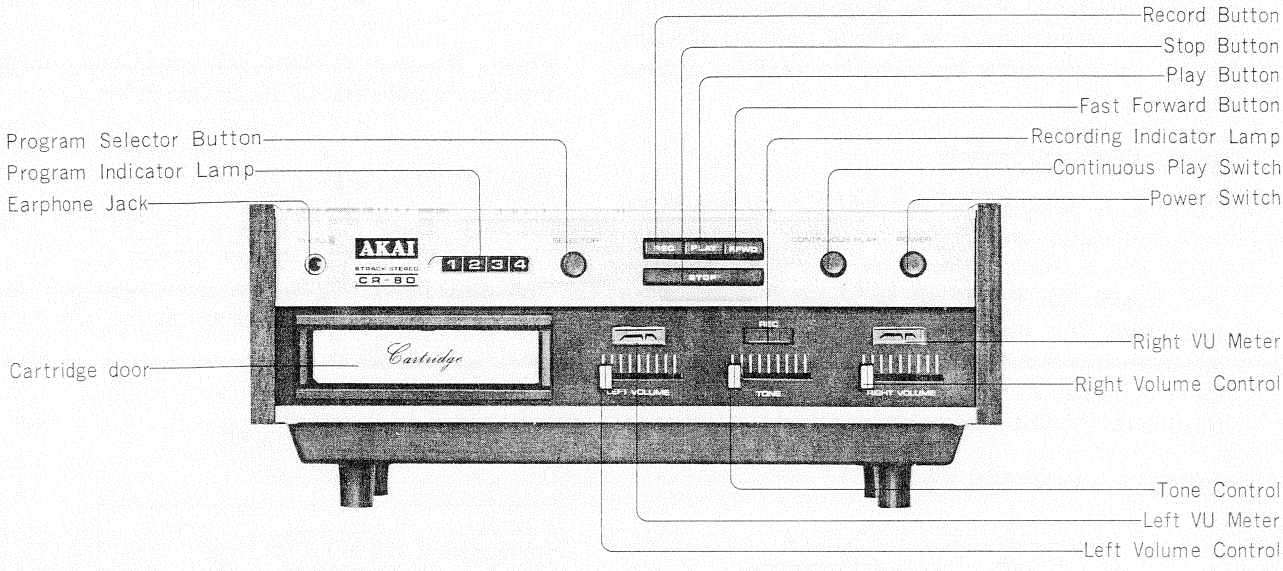
FREQUENCY RESPONSE

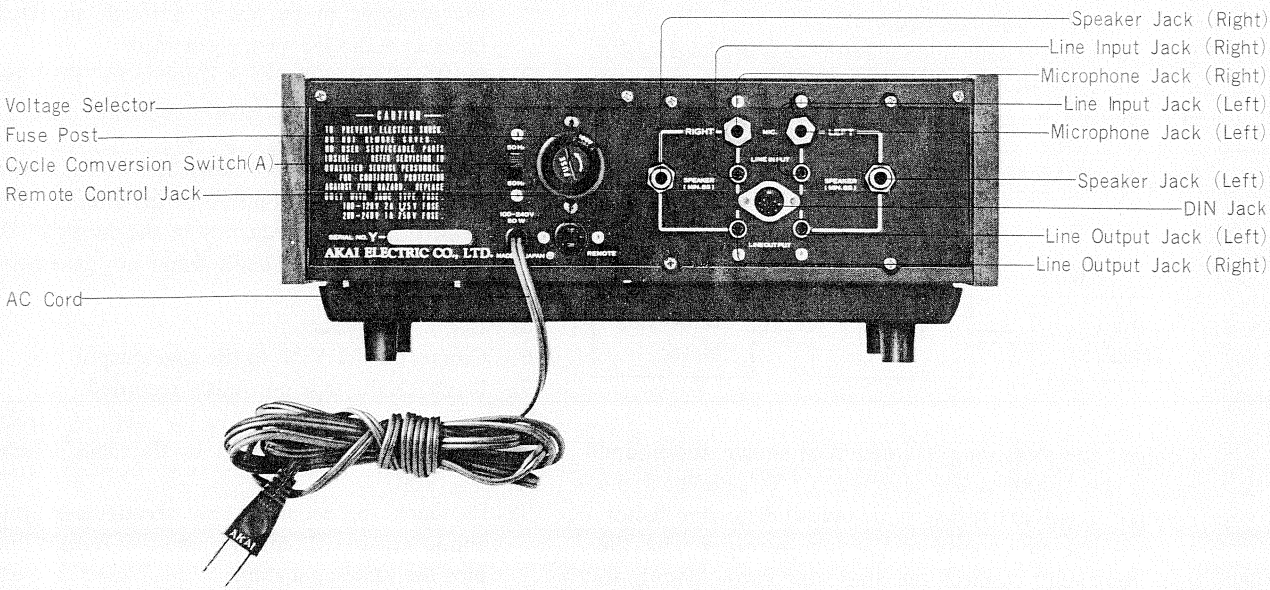


Connect the measuring instrument as in the above diagram, and measure the frequency response in the following sequence :
RECORD :
1) Give a sine wave of 1,000 Hz to the Line Input of the recorder to be tested, through an attenuator from an audio frequency generator.
2) Set the Record/Playback Knob in to "Rec" position and adjust the line input volume so that the VU meter needle indicates "0" VU.
3) Under the condition described in (2), lower the input level 10 dB by means of the attenuator.
4) Record the spot frequency in the range of 50 Hz to 16,000 Hz from the audio frequency generator.

PLAYBACK :
5) Depress Play Button.
6) Connect a V.T.V.M. to the Line output.
7) Playback the tape previously recorded.
8) Adjust the output level to "0" dbm at 1,000 Hz as indicated on the V.T.V.M. by the range selector of a V.T.V.M.
9) Playback the recorded spot frequencies under the conditions in (8) ; make a memo of output level and plot the value on a graph.

III. CONTROL LOCATIONS





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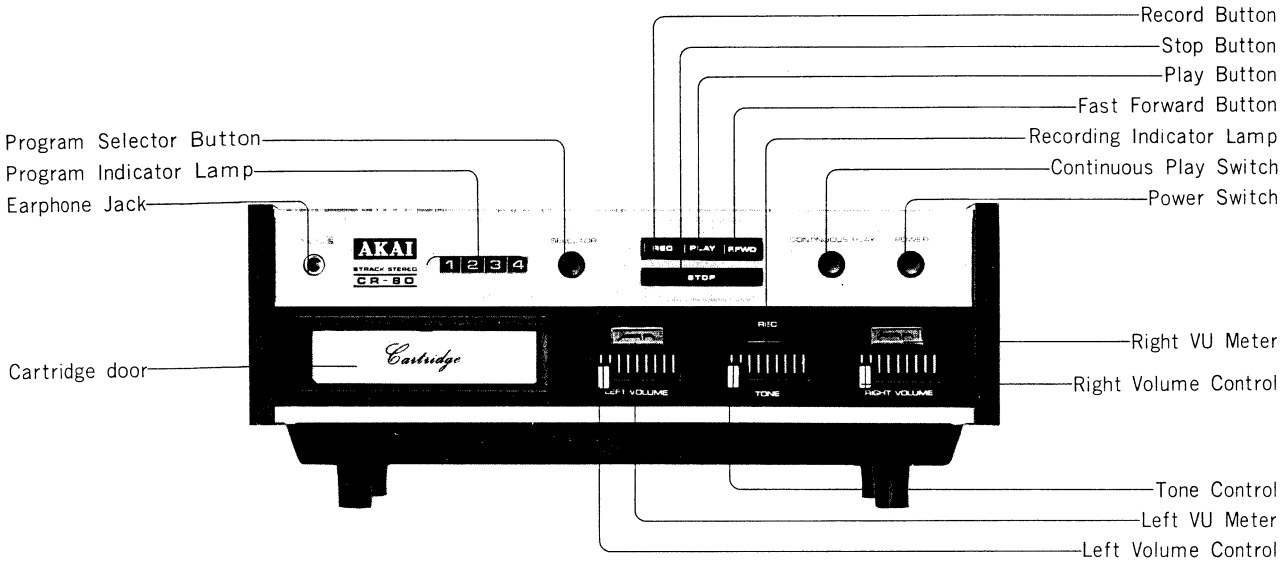
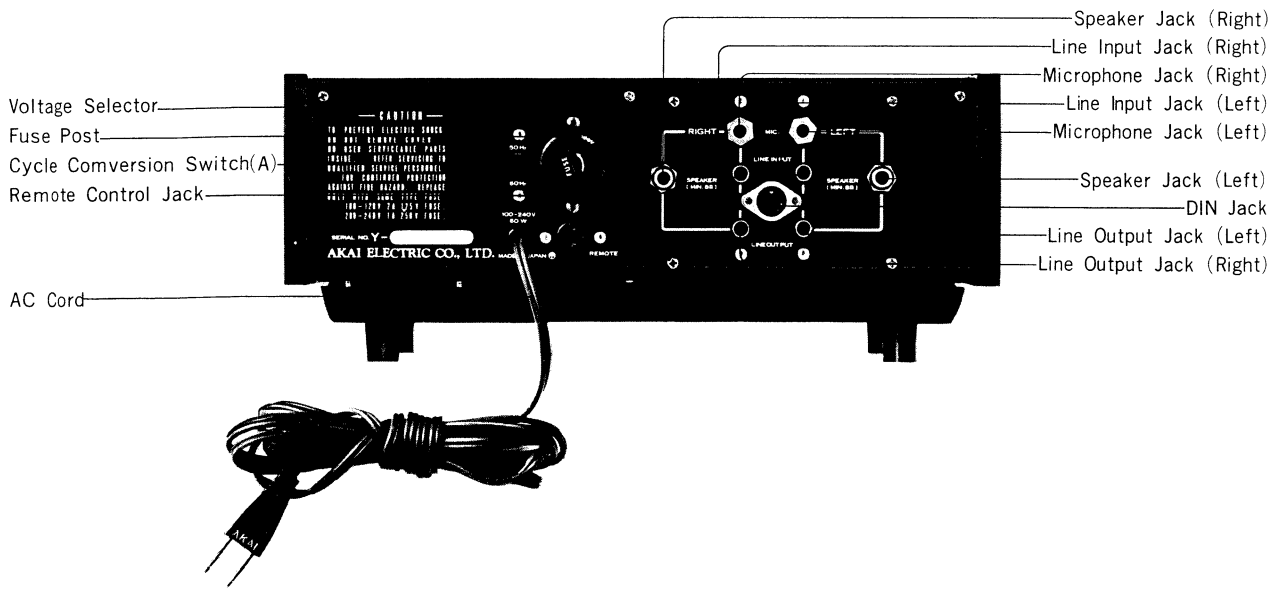
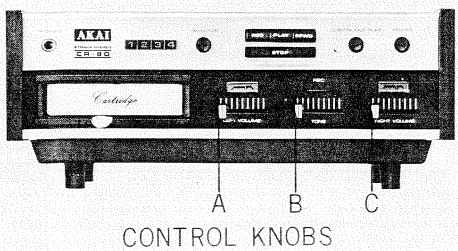




IV. DISMANTLING OF TAPE TRANSPORT UNIT & AMPLIFIERS

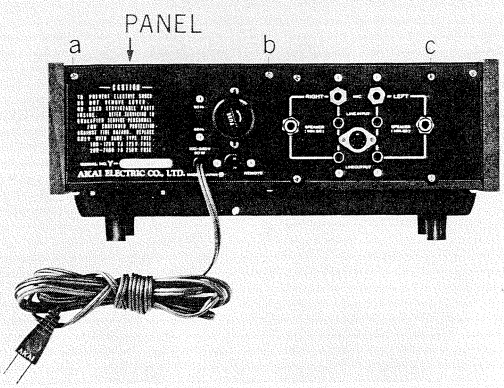
In case of trouble, etc. necessitating disassembly, please disassemble in the order shown in photographs. Reaxxemble in reverse order.

1



CONTROL KNOBS

2



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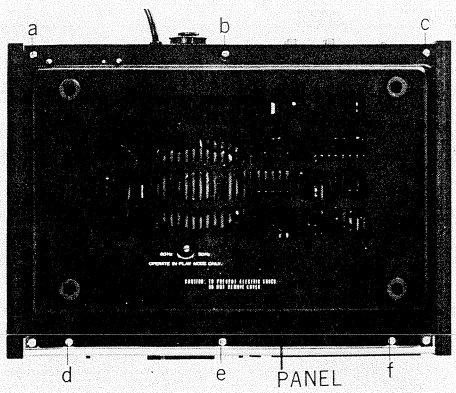

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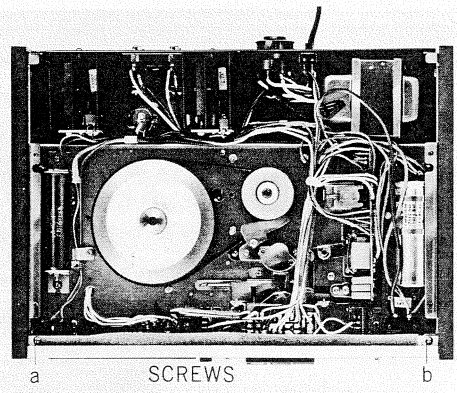

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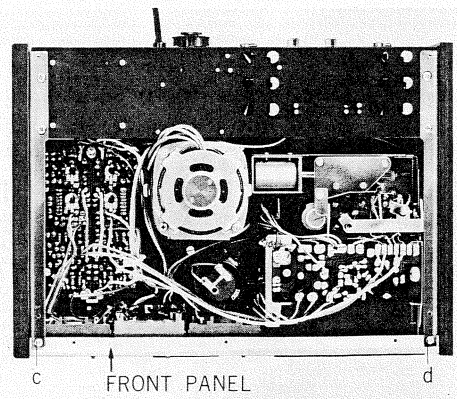

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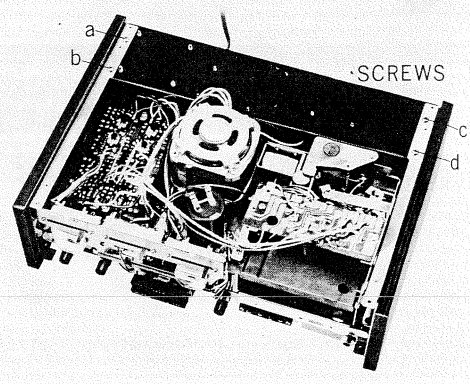

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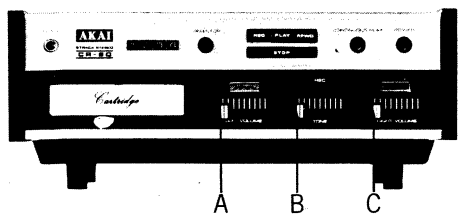
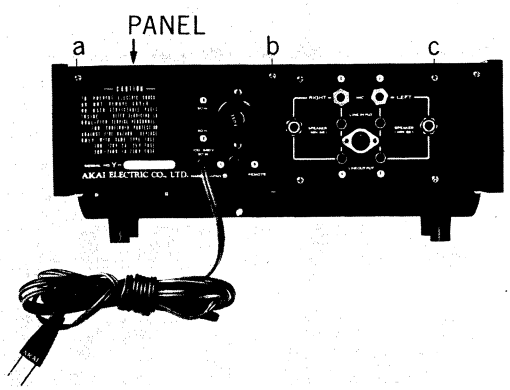


CONTROL KNOBS

2



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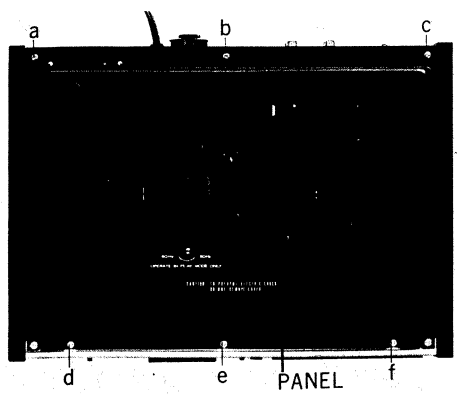

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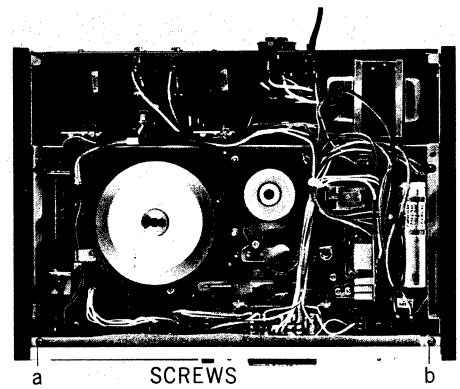

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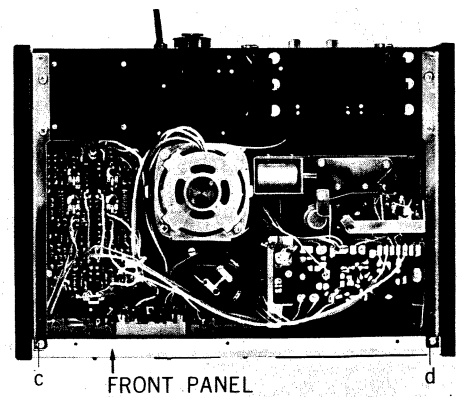

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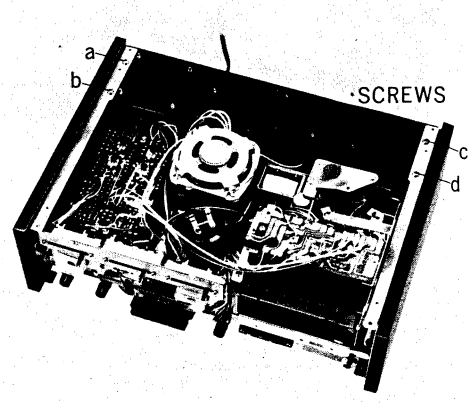

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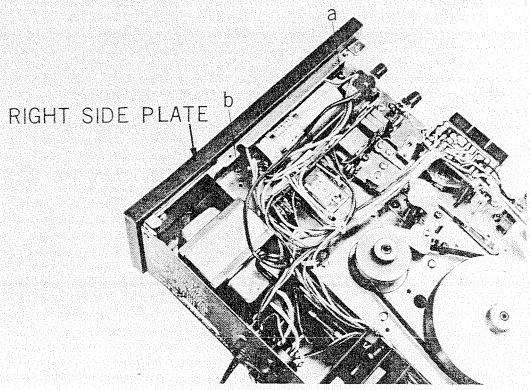

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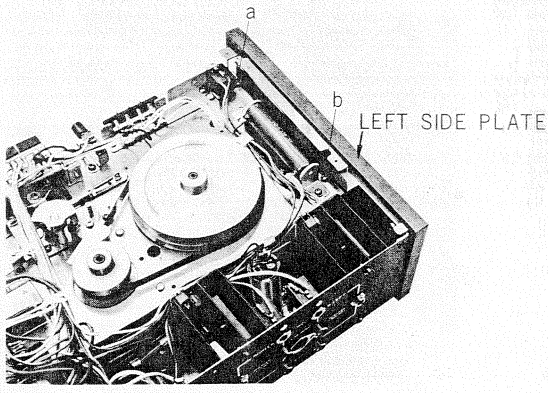

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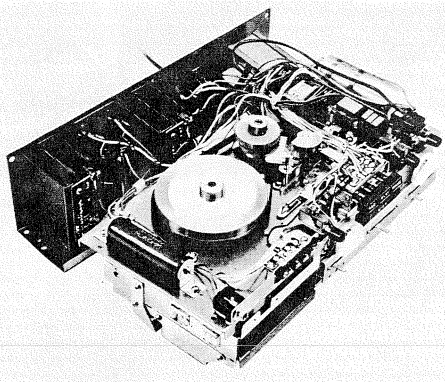
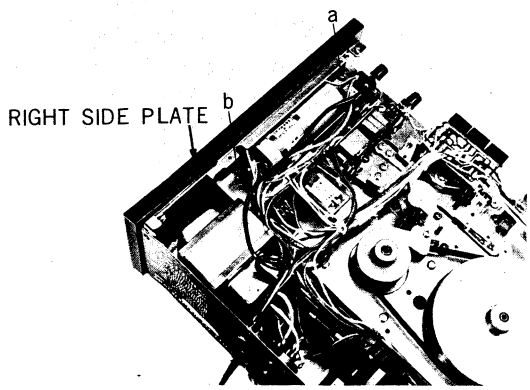


AMPLIFIER & MECHANISM ADJUSTMENT

7



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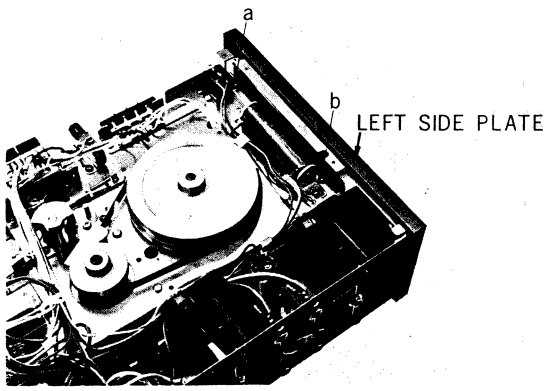

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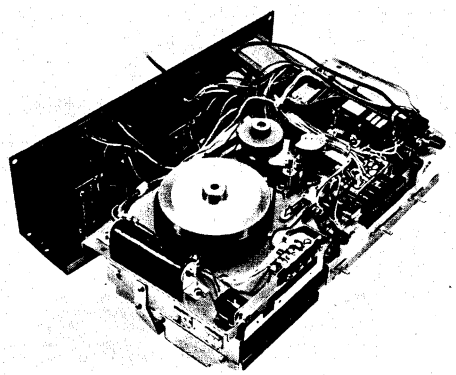

AMPLIFIER & MECHANISM ADJUSTMENT

V. MECHANISM ADJUSTMENT

1) ADJUSTMENT OF AZIMUTH ALIGNMENT (See Fig. 1)
Playback an azimuth alignment Test Tape (8,000 Hz recorded tape) and set the azimuth alignment of head assembly by turning screw (c) until maximum playback output of program 2 or 3 is obtained.

2) HEIGHT ADJUSTMENT (See Fig. 1)
   A) Playback *a test tape and turn screw (d) until maximum gain of program 1 is obtained.
   B) Set *a blank test tape to recorder, make a recording, and then make an erasing test. If erasing is not complete, adjust as follows :
      (I) Turn screws (a) and (b) clockwise simultaneously forty-five degrees and then make erasing test again.
      Note : The blank test tape should be demagnetized every time an erasing test is made.
      (II) If the erasing is not complete after the above adjustment, turn screws (a) and (b) clockwise again ten to fifteen degrees simultaneously.
      (III) If erasing is still not complete, repeat step 2) until complete erasure is accomplished. Playback Azimuth Alignment test tape again and turn screw (c) until maximum program gain of program 2 or 3 is obtained.
      (IV) Playback test tape again and turn screw (d) until maximum gain of program 1 is obtained.

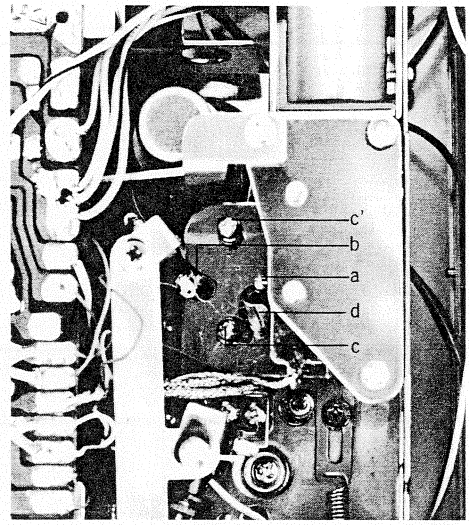

Fig. 1

* TEST TAPE
This test tape is specially designed by AKAI for Height Adjustment tests.

Program 1 ..... 1,000 Hz
Program 2 ..... Blank
Program 3 ..... 1,000 Hz
Program 4 ..... 3,000 Hz

* BLANK TEST TAPE
This is also a special tape designed by AKAI. Duration of tape is only 15 seconds.

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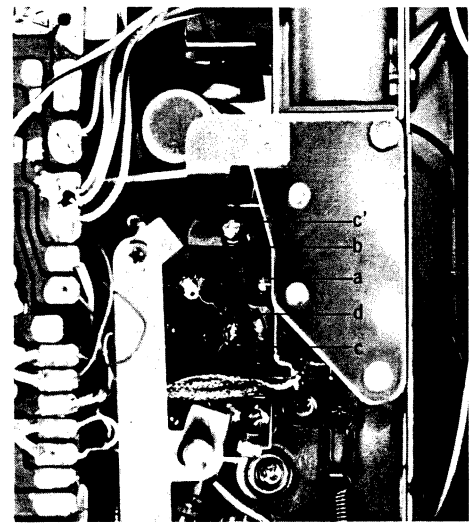

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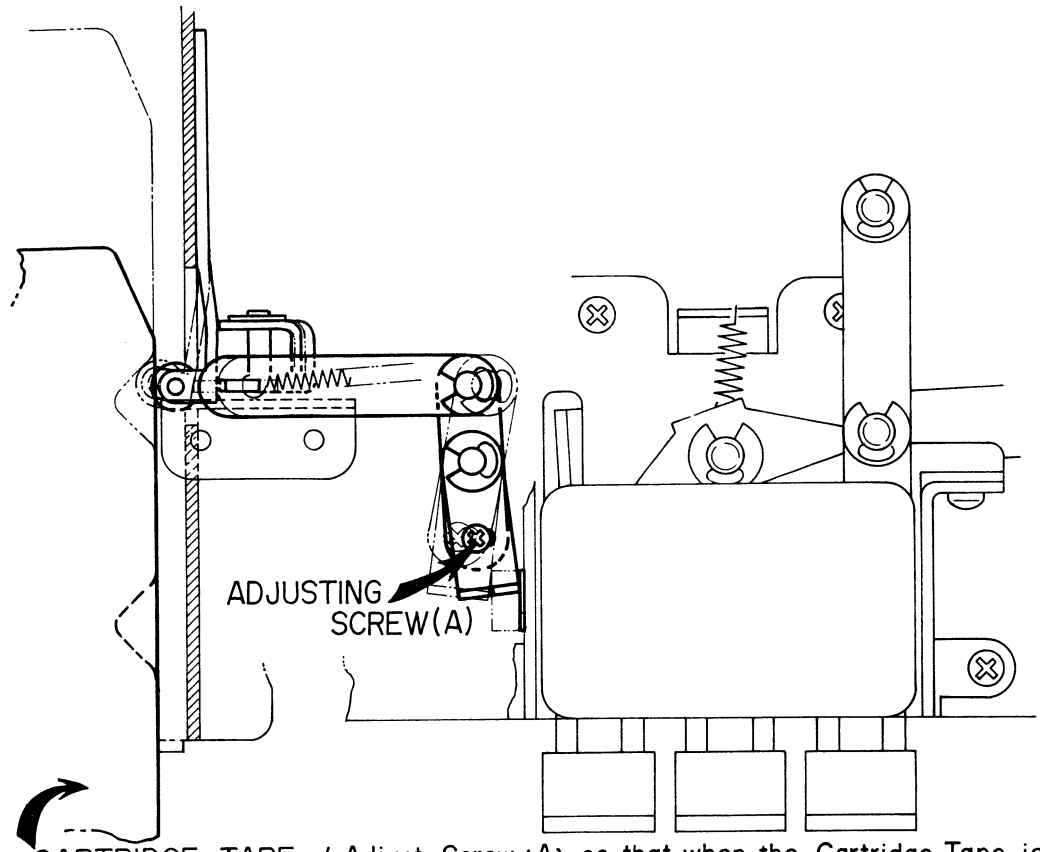


(Adjust Screw (A) so that when the Cartridge Tape is removed , or reset , the Mode Selector Knob stops .)

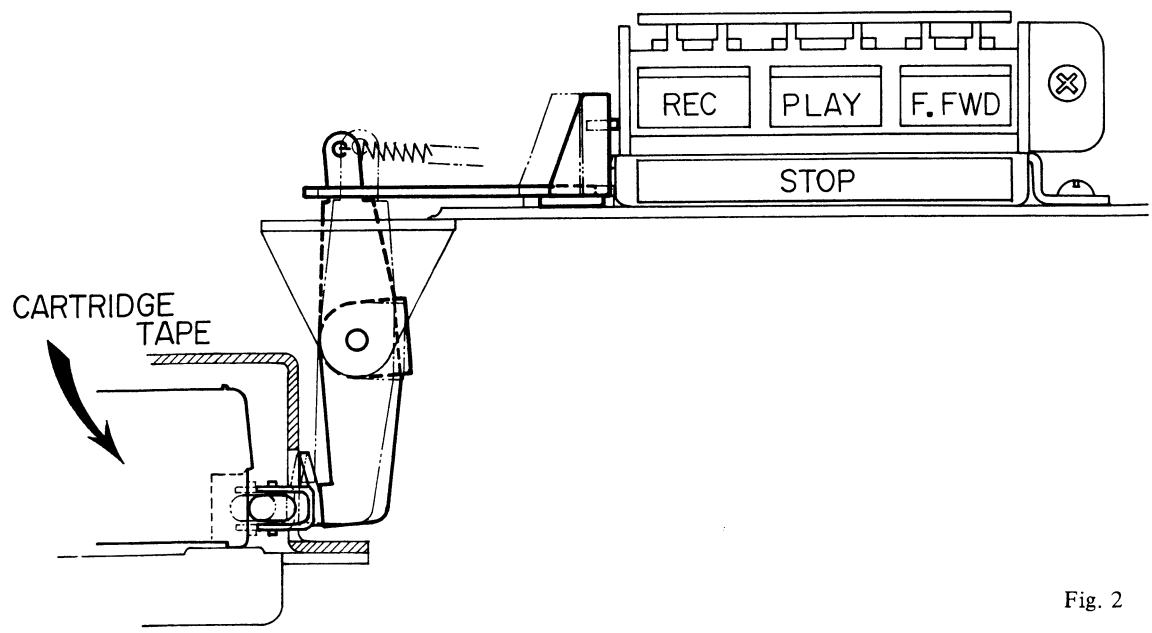
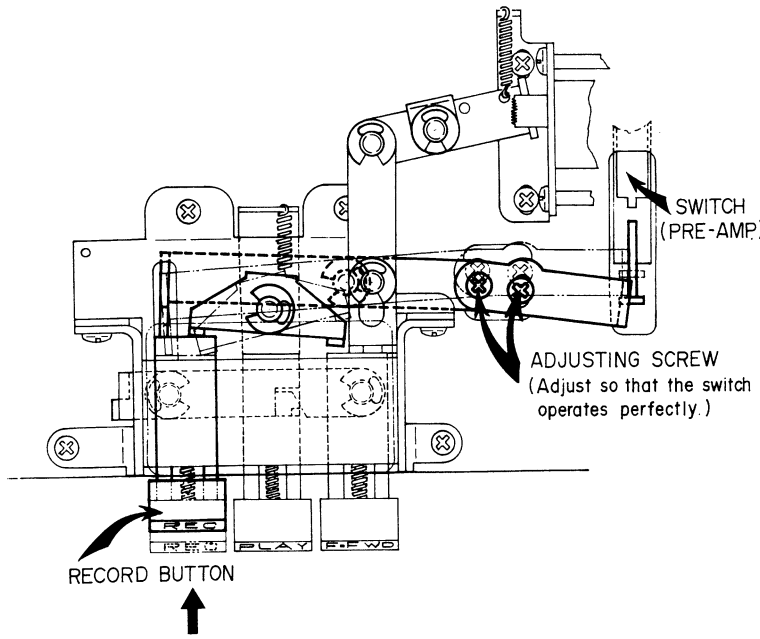
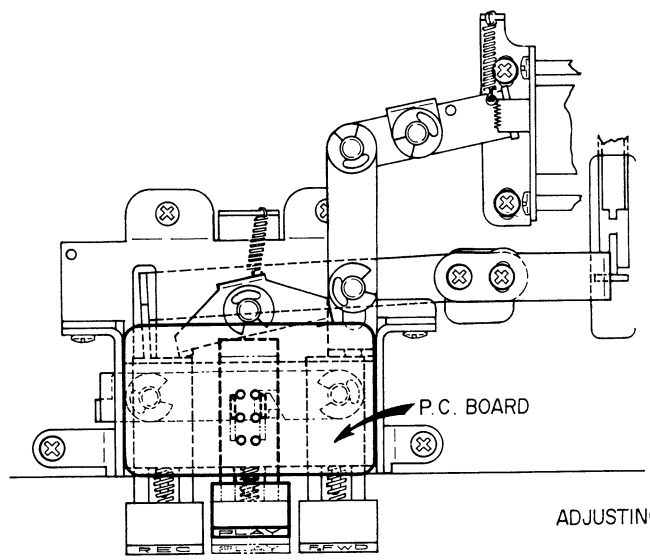
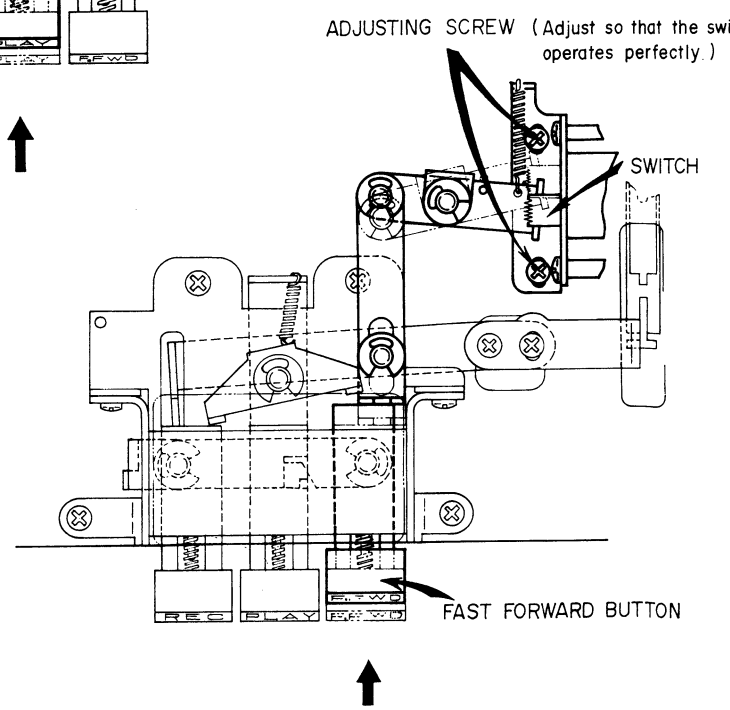


Fig. 2


SWITCH
(PRE-AMP)
ADJUSTING SCREW
(Adjust so that the switch
operates perfectly.)
REC
PLAY
F.FWD
RECORD BUTTON


P.C. BOARD
REC
PLAY
F.FWD


ADJUSTING SCREW (Adjust so that the switc
operates perfectly.)
SWITCH
REC
PLAY
F.FWD
FAST FORWARD BUTTON

VI. AMPLIFIER ADJUSTMENT

1. ADJUSTMENT OF RECORDING BIAS FREQUENCY (See Fig. 1)

a) Put on the resistor 10 or 50 Ohms in series with the Bias Head and connect the Vertical Input Terminal of the Oscilloscope to points (A) and (B).

b) Feed in a sine wave signal from an Audio Frequency Oscillator to the Horizontal Input of the Oscilloscope and tune the Dial of the Audio Frequency Oscillator until the Oscilloscope displays a circular or linear pattern. Then read the figure on the Dial of the Audio Frequency Oscillator.

c) If it reads 65 KHz (± 5 KHz), the Recording Bias Frequency is correct.

d) If incorrect, it may be adjusted by inserting another condenser (CO-404) value 1000 PF (820 PF).

2. ADJUSTMENT OF RECORDING BIAS VOLTAGE

Connect a V.T.V.M. to point (a) and (b) and measure the Bias Voltage. Correct Bias Voltage is between 18 to 20 V AC. Adjustment can be made by inserting another resistor or changing resistors (R-408, R-409 value 120 K Ohms).

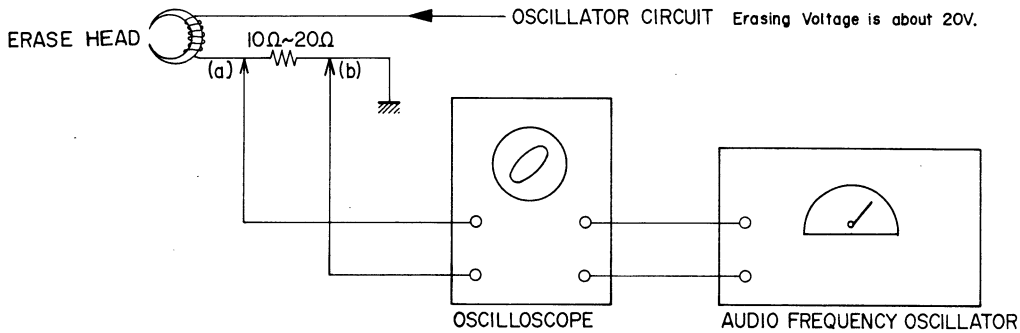


Fig. 1

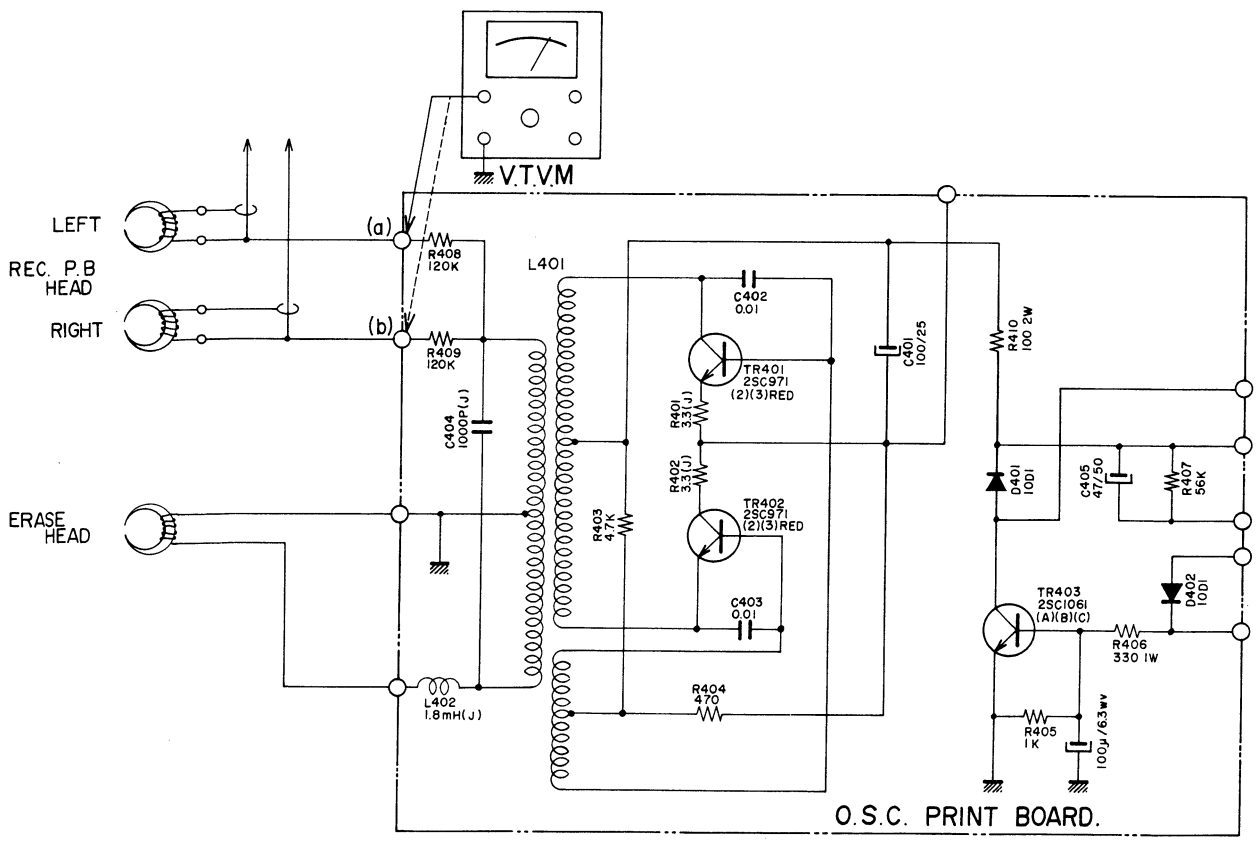


Fig. 2

3. ADJUSTMENT OF LINE OUTPUT LEVEL PLAYBACK (See Fig. 3)

1) Turn Volume Control (VR-1) (50 KA) up to maximum.
2) Set machine to "Play" position.
3) Connect a V.T.V.M. (use VTVM with milli-volt scale) to the Line Output Jack.
4) Play back a Test Tape (500 Hz "0" VU recorded) and turn the volume (VR-101) (20 KB) until the line output level reaches +4 dB 1.238 V.

4. RECORDING AND PLAYBACK (Figs. 3 and 4)

1) Load a Blank Test Tape.
2) Set recorder to Recording Mode.
3) Supply a 1000 Hz sine wave signal from an Audio Frequency Oscillator through the attenuator to the Line Input of CR-80 and adjust the attenuator so that the VU Meter needle indicates "0" VU (intermediate between red and black).
4) After a few seconds of recording, playback the recorded tape from the starting position, turning the main volume up to maximum.
5) If the line output level does not reach 0 (± 2 dB), repeat recording and playback procedure (from item 3), adjusting semi-fixed VR-102 (2 KB) until 0 dB (± 2 dB) is obtained, both on recording and playback.

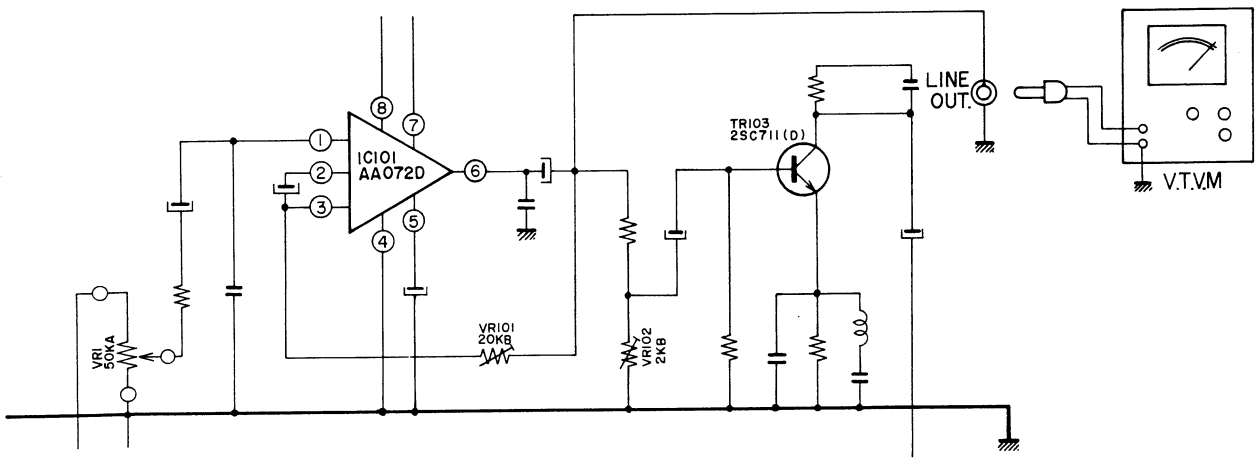


Fig. 3

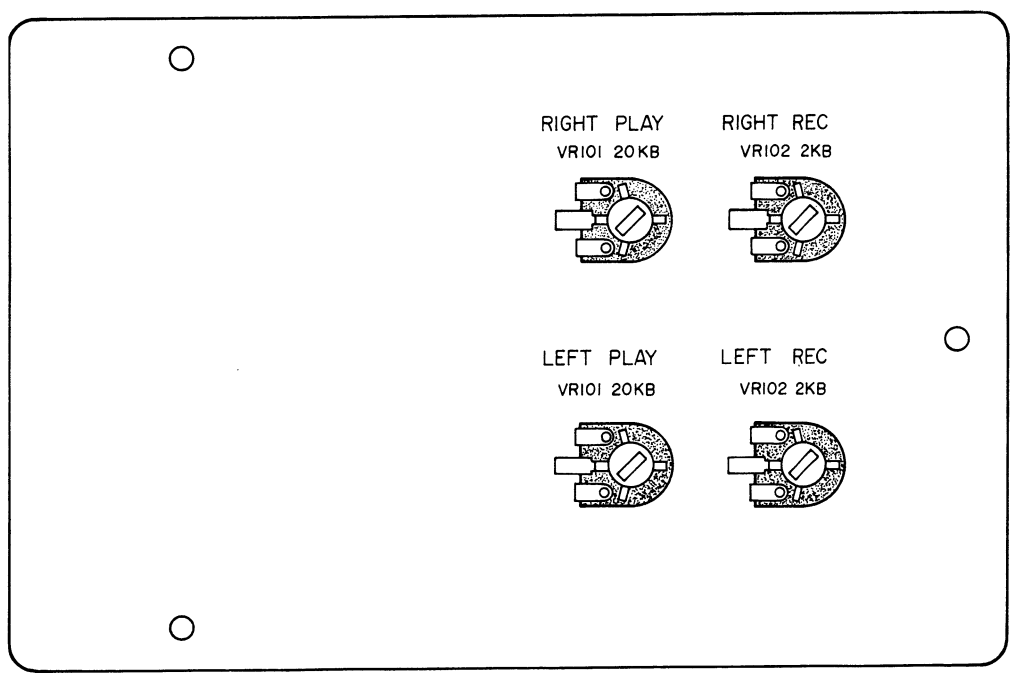


Fig. 4

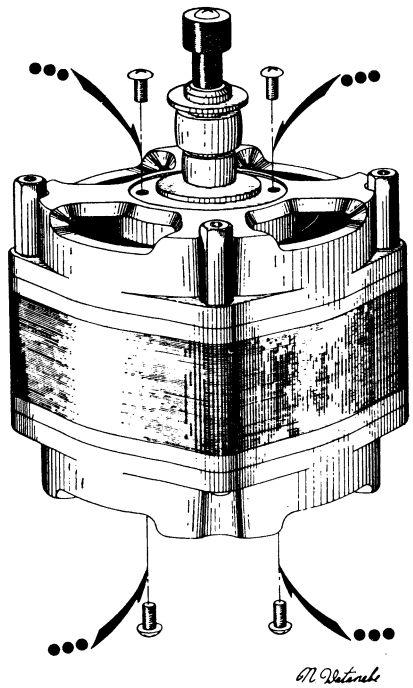
VII. MAINTENANCE PROCEDURES

1. LUBRICATION INSTRUCTION

For maximum service life and optimum performance, lubricate the parts identified below after each 500 hours of operation. Use only light machine oil of good quality.

Motor (See Fig. 1)

CAUTION : DO NOT OVER-LUBRICATE, AND WIPE OFF EXCESS OIL WITH A COTTON SWAB SOAKED IN ALCOHOL. OTHERWISE, THE EXCESS LUBRICANT MAY BE SCATTERED DURING OPERATION, AND THE RUBBER COMPONENT PARTS WILL DETERIORATE.

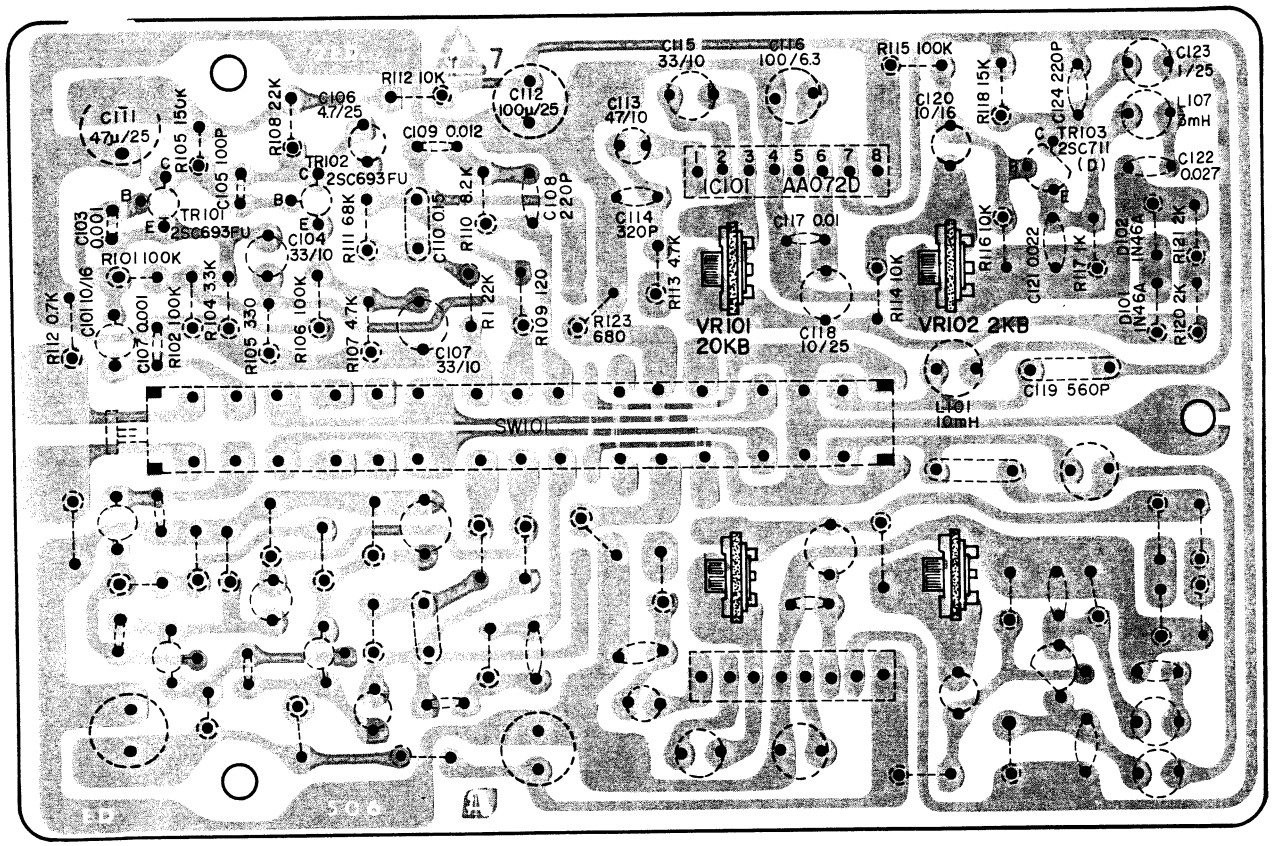


● 1 drop MOTOR

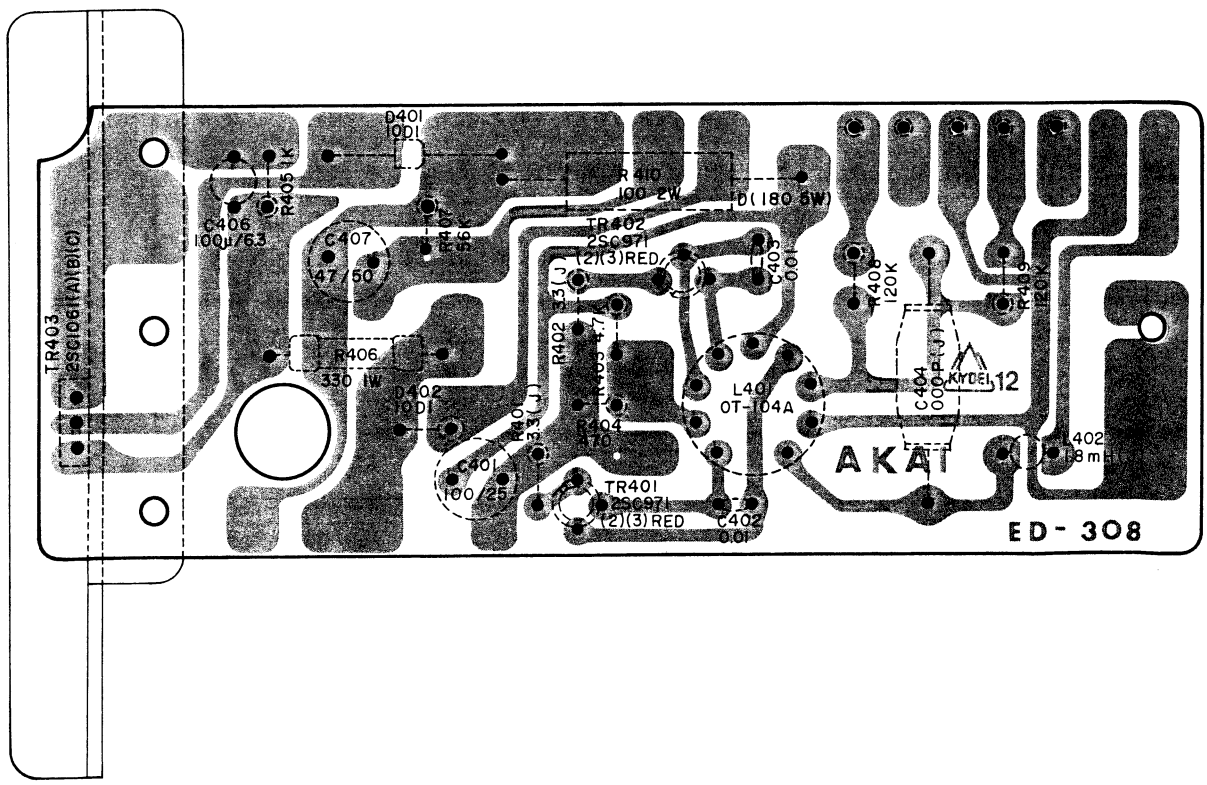
Fig. 1

VIII. COMPOSITE VIEWS OF COMPONENTS

PRE-AMP. P.C. BOARD (ED0506)

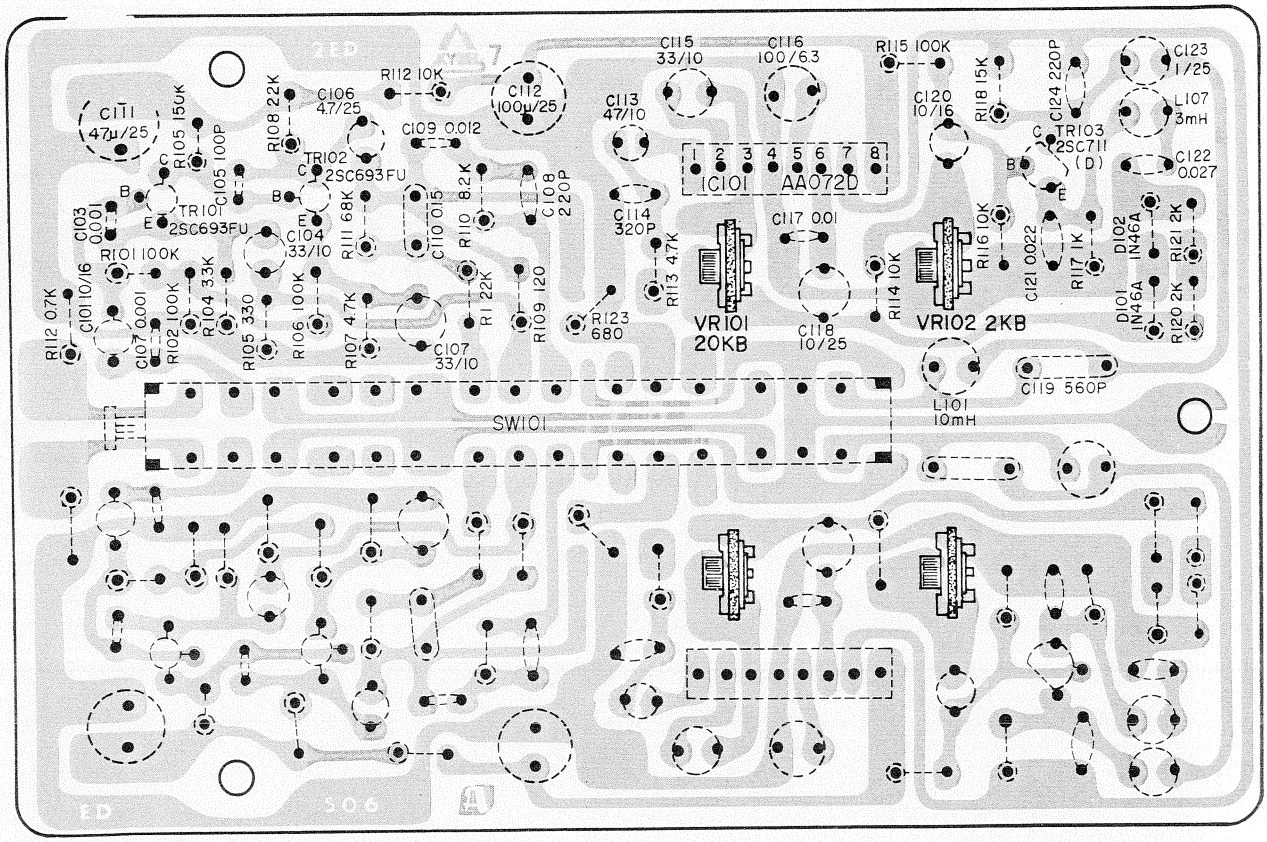


OSC. P.C. BOARD (ED-308)

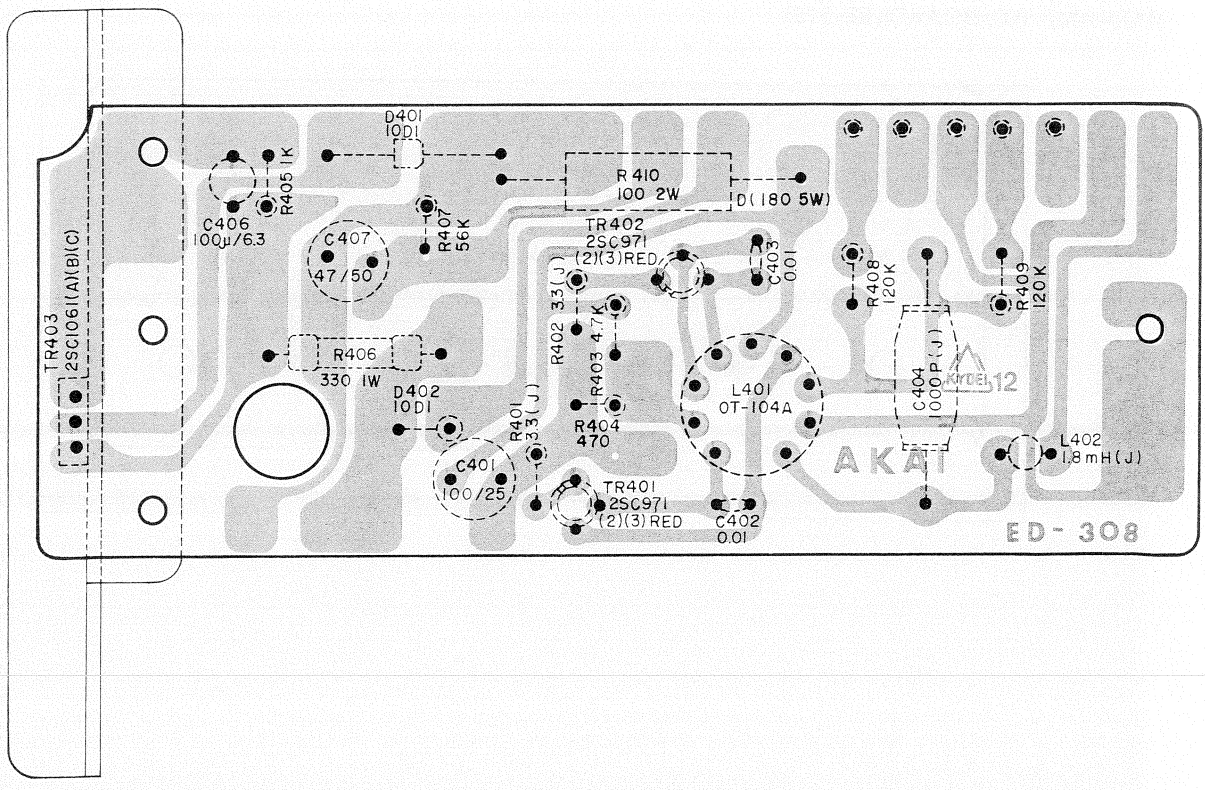


VIII. COMPOSITE VIEWS OF COMPONENTS

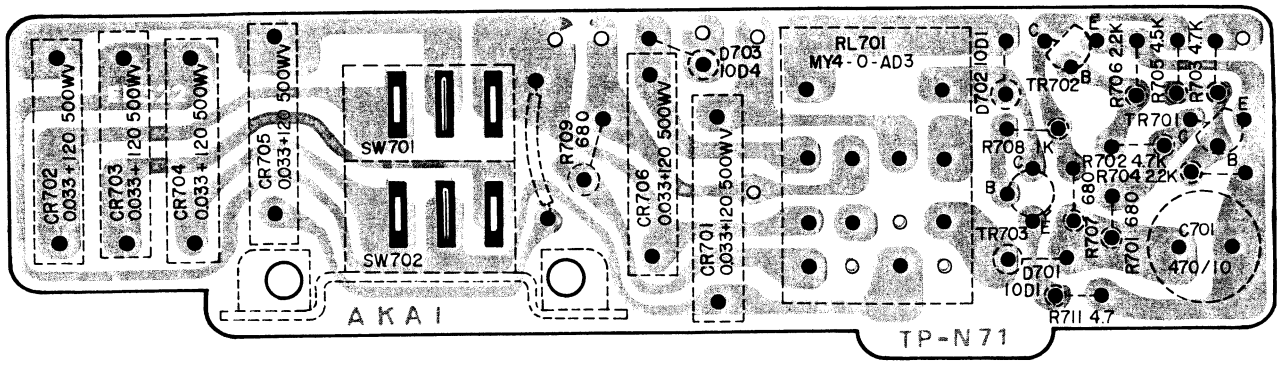
PRE-AMP. P.C. BOARD (ED0506)



OSC. P.C. BOARD (ED-308)

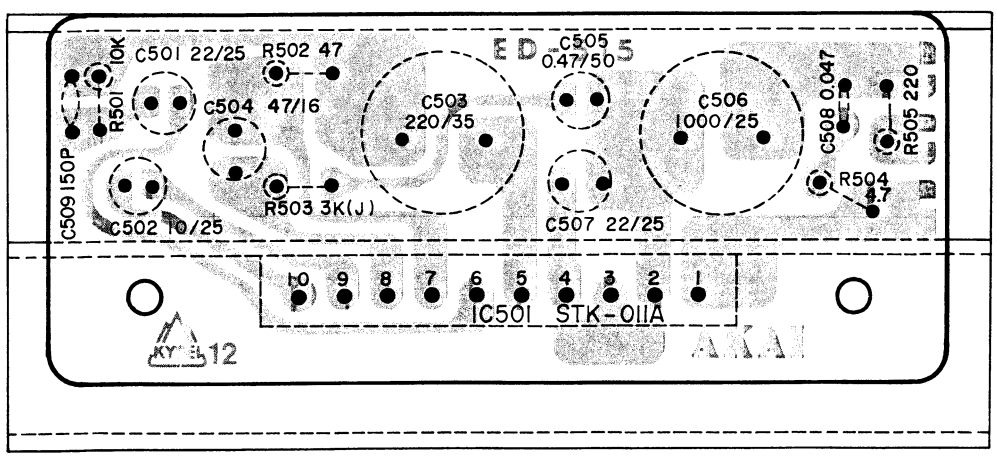


RELAY P.C. BOARD (ED-522)

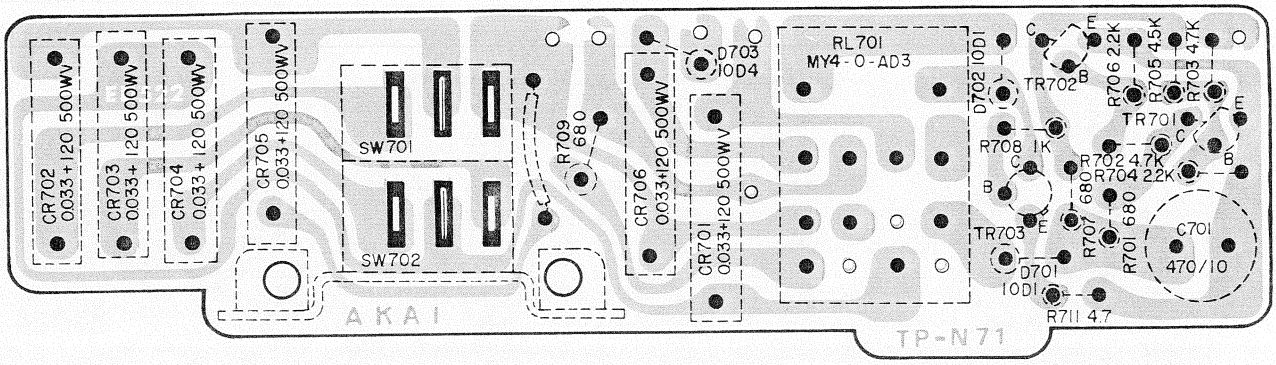


TR701 2SC711(D)
TR702 2SC711(D)
TR703 2SC968(4)

MAIN AMP. P.C. BOARD (ED-515)

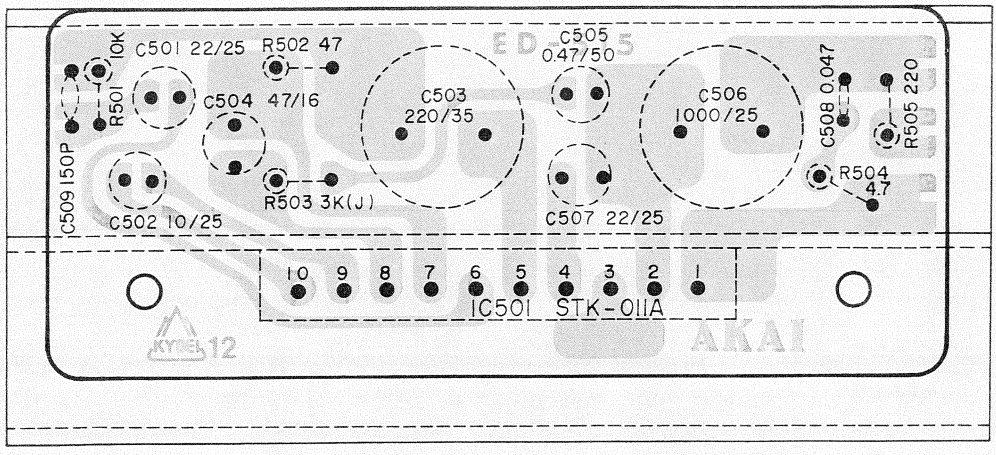


RELAY P.C. BOARD (ED-522)

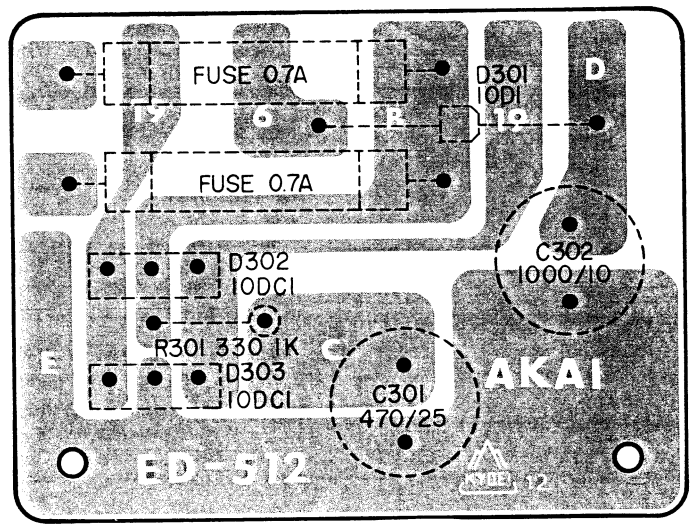


TR701 2SC711(D)
TR702 2SC711(D)
TR703 2SC968(4)

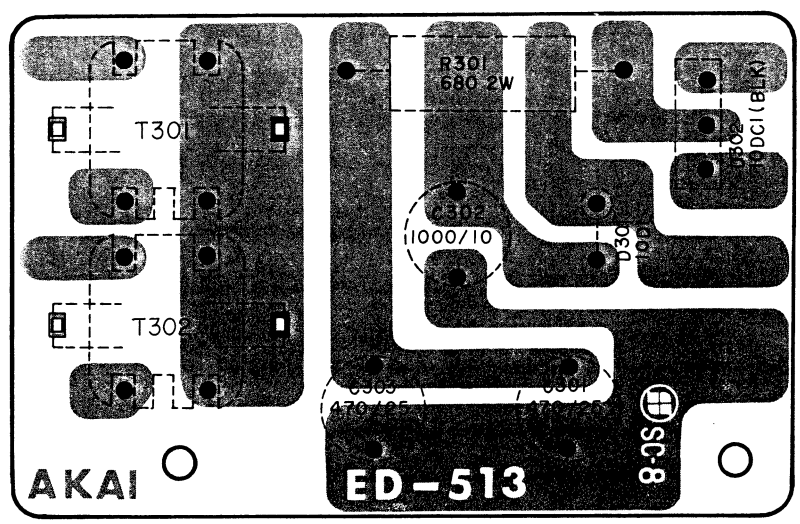
MAIN AMP. P.C. BOARD (ED-515)



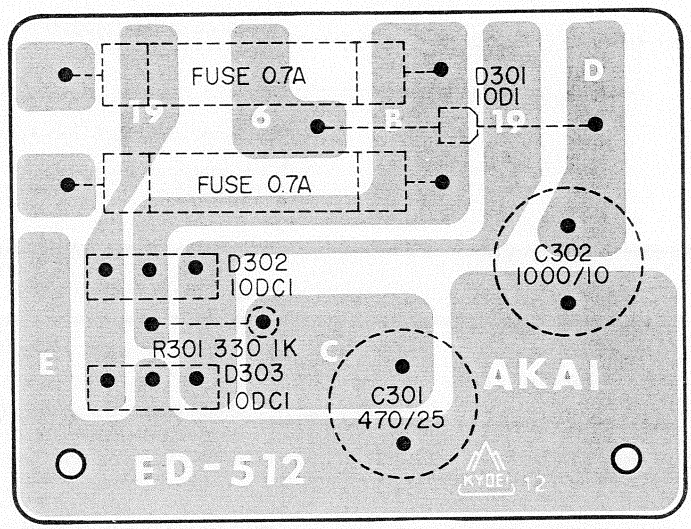
POWER SOURCE P.C. BOARD (ED-512)



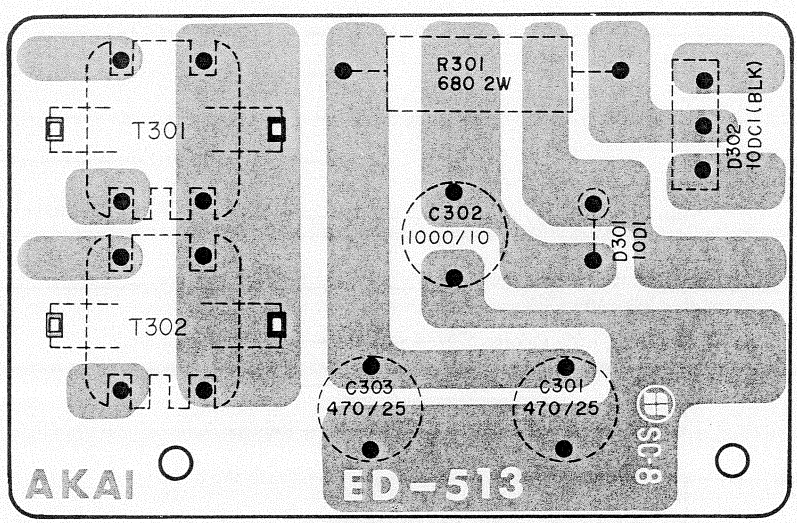
(D) POWER SOURCE P.C. BOARD (ED-513)



POWER SOURCE P.C. BOARD (ED-512)



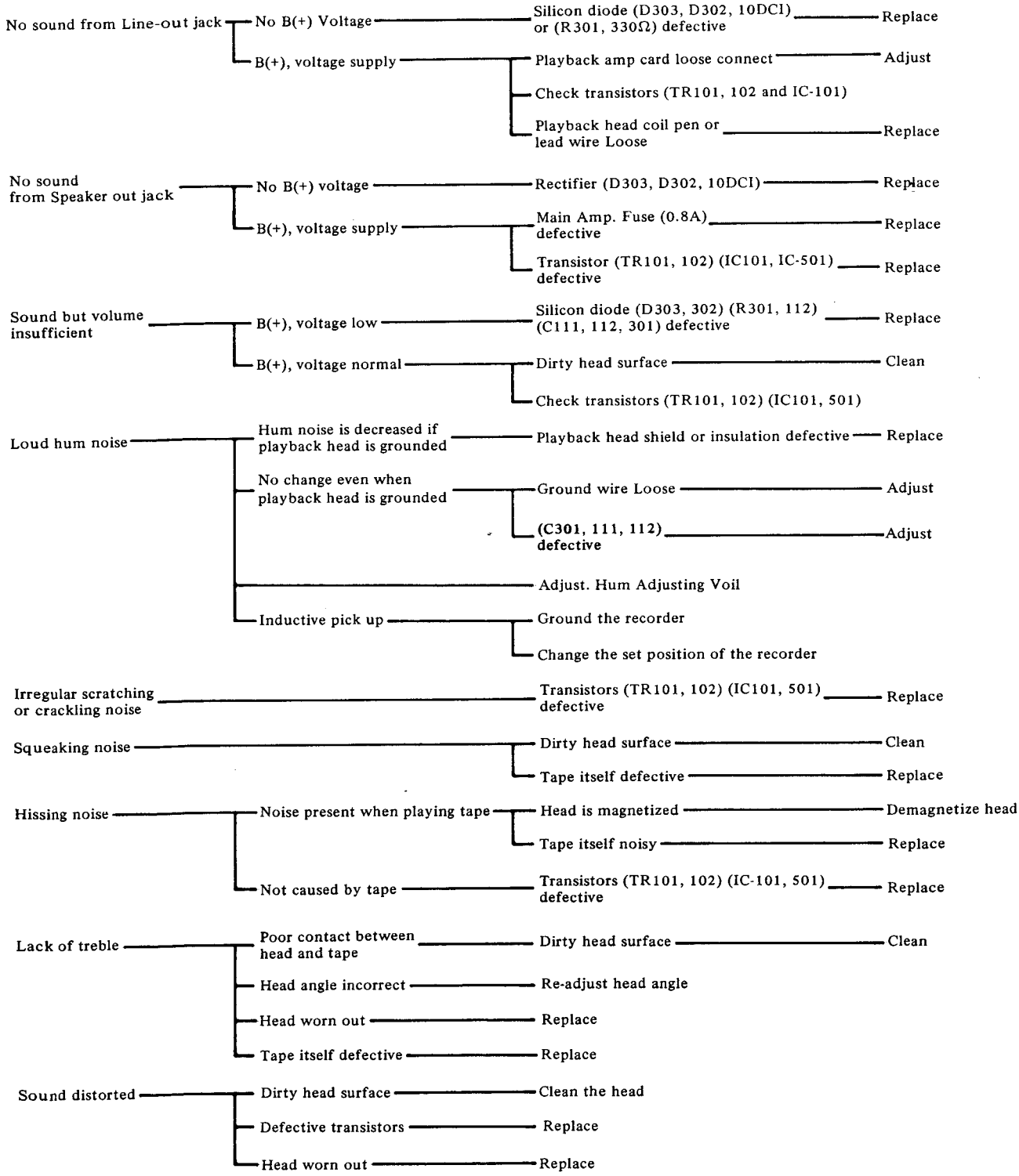
(D) POWER SOURCE P.C. BOARD (ED-513)



IX. TROUBLE SHOOTING CHART

SECTION "A" TROUBLES WITH AMPLIFIER

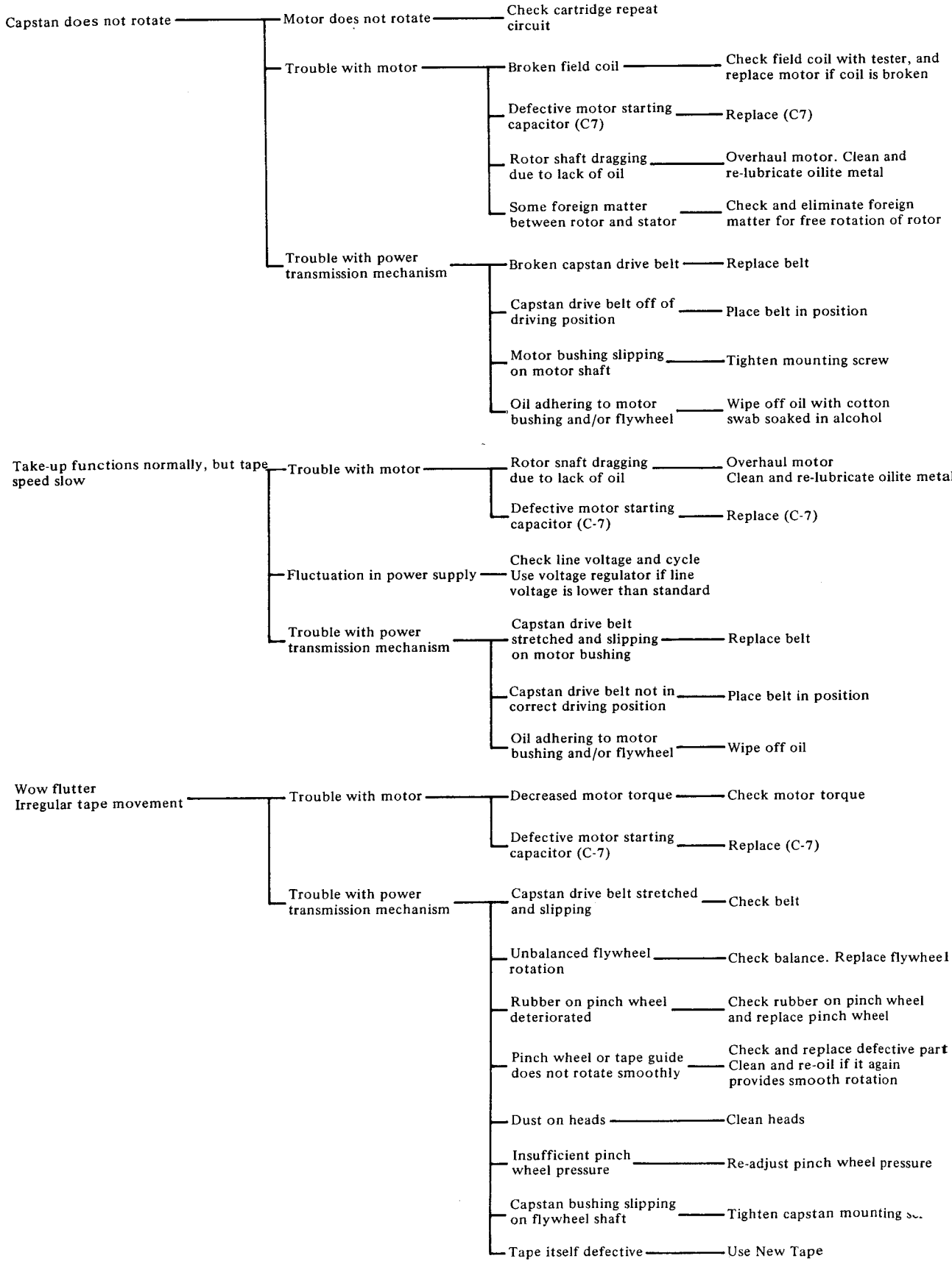
1. Playback problems. (Unit set in play position.)

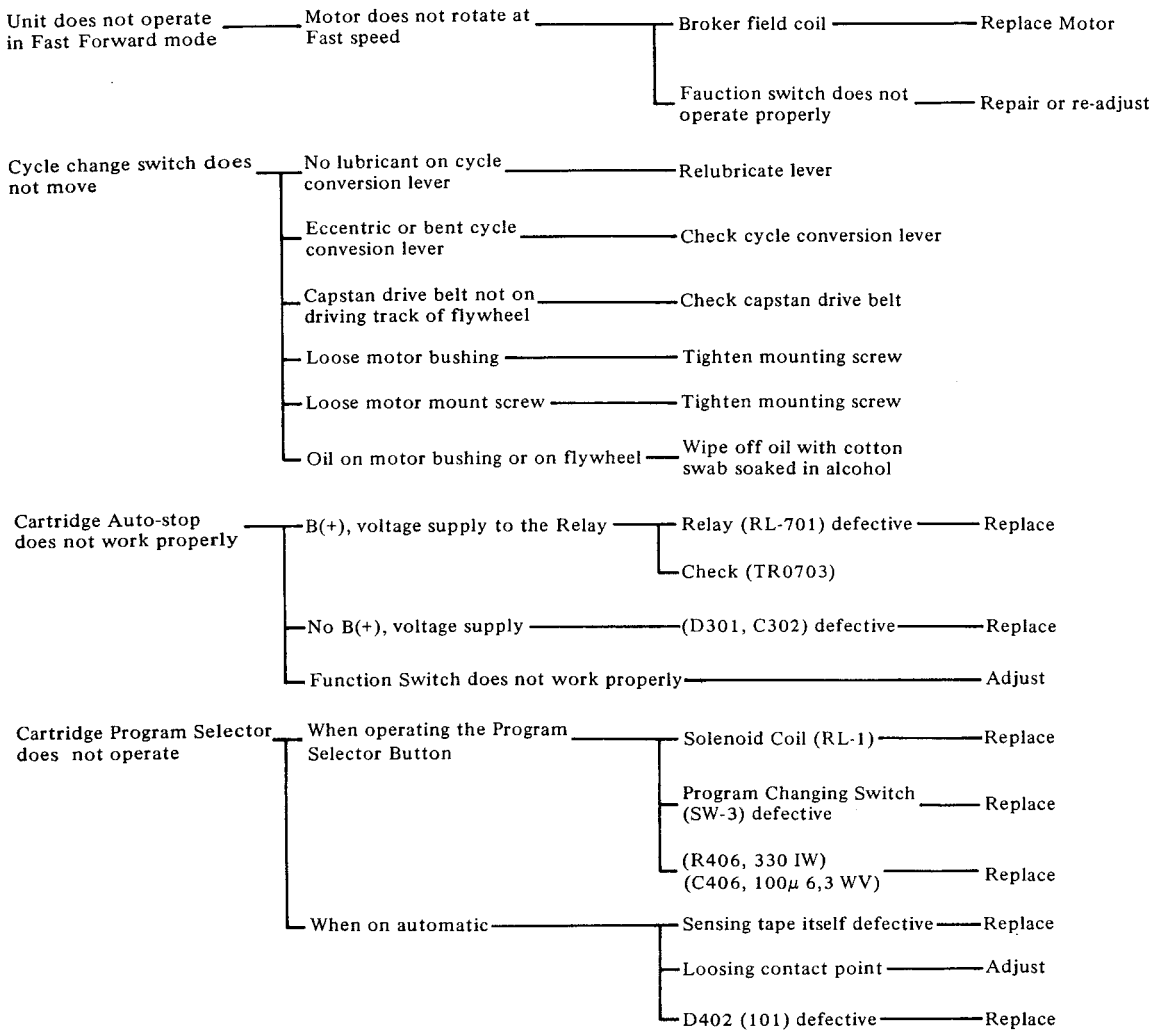


2. Recording problems.
(Unit plays back pre-recorded tapes satisfactorily, but recording unsatisfactory.)

Sound fades or drops out	Dirty head surface	Clean
	Tape itself defective	Replace recording tape
	Back tension too weak	Adjust the tension of supply spindle
	Recording bias voltage out of adjustment	Re-adjust
Much difference in recording levels between left and right channels	Difference sensitivity of the line volume itself	Replace
	Recording level out of adjustment	Adjust (VR-102, 2KB)

SECTION "B" TROUBLE WITH TAPE TRANSPORT MECHANISM


Capstan does not rotate
Motor does not rotate
Check cartridge repeat circuit
Trouble with motor
Broken field coil
Check field coil with tester, and replace motor if coil is broken
Defective motor starting capacitor (C7)
Replace (C7)
Rotor shaft dragging due to lack of oil
Overhaul motor. Clean and re-lubricate oilite metal
Some foreign matter between rotor and stator
Check and eliminate foreign matter for free rotation of rotor
Trouble with power transmission mechanism
Broken capstan drive belt
Replace belt
Capstan drive belt off of driving position
Place belt in position
Motor bushing slipping on motor shaft
Tighten mounting screw
Oil adhering to motor bushing and/or flywheel
Wipe off oil with cotton swab soaked in alcohol
Take-up functions normally, but tape speed slow
Trouble with motor
Rotor snaft dragging due to lack of oil
Overhaul motor
Clean and re-lubricate oilite metal
Defective motor starting capacitor (C-7)
Replace (C-7)
Fluctuation in power supply
Check line voltage and cycle
Use voltage regulator if line voltage is lower than standard
Trouble with power transmission mechanism
Capstan drive belt stretched and slipping on motor bushing
Replace belt
Capstan drive belt not in correct driving position
Place belt in position
Oil adhering to motor bushing and/or flywheel
Wipe off oil
Wow flutter
Irregular tape movement
Trouble with motor
Decreased motor torque
Check motor torque
Defective motor starting capacitor (C-7)
Replace (C-7)
Trouble with power transmission mechanism
Capstan drive belt stretched and slipping
Check belt
Unbalanced flywheel rotation
Check balance. Replace flywheel
Rubber on pinch wheel deteriorated
Check rubber on pinch wheel and replace pinch wheel
Pinch wheel or tape guide does not rotate smoothly
Check and replace defective part
Clean and re-oil if it again provides smooth rotation
Dust on heads
Clean heads
Insufficient pinch wheel pressure
Re-adjust pinch wheel pressure
Capstan bushing slipping on flywheel shaft
Tighten capstan mounting sc.
Tape itself defective
Use New Tape


Unit does not operate in Fast Forward mode
Motor does not rotate at Fast speed
Broker field coil
Replace Motor
Fauction switch does not operate properly
Repair or re-adjust
Cycle change switch does not move
No lubricant on cycle conversion lever
Relubricate lever
Eccentric or bent cycle convesion lever
Check cycle conversion lever
Capstan drive belt not on driving track of flywheel
Check capstan drive belt
Loose motor bushing
Tighten mounting screw
Loose motor mount screw
Tighten mounting screw
Oil on motor bushing or on flywheel
Wipe off oil with cotton swab soaked in alcohol
Cartridge Auto-stop does not work properly
B(+), voltage supply to the Relay
Relay (RL-701) defective
Replace
Check (TR0703)
No B(+), voltage supply
(D301, C302) defective
Replace
Function Switch does not work properly
Adjust
Cartridge Program Selector does not operate
When operating the Program Selector Button
Solenoid Coil (RL-1)
Replace
Program Changing Switch (SW-3) defective
Replace
(R406, 330 IW)
(C406, 100μ 6,3 WV)
Replace
When on automatic
Sensing tape itself defective
Replace
Loosing contact point
Adjust
D402 (101) defective
Replace

CR-80 SCHEMATIC DIAGRAM 14006482

PRE. AMP. PRINT BOARD

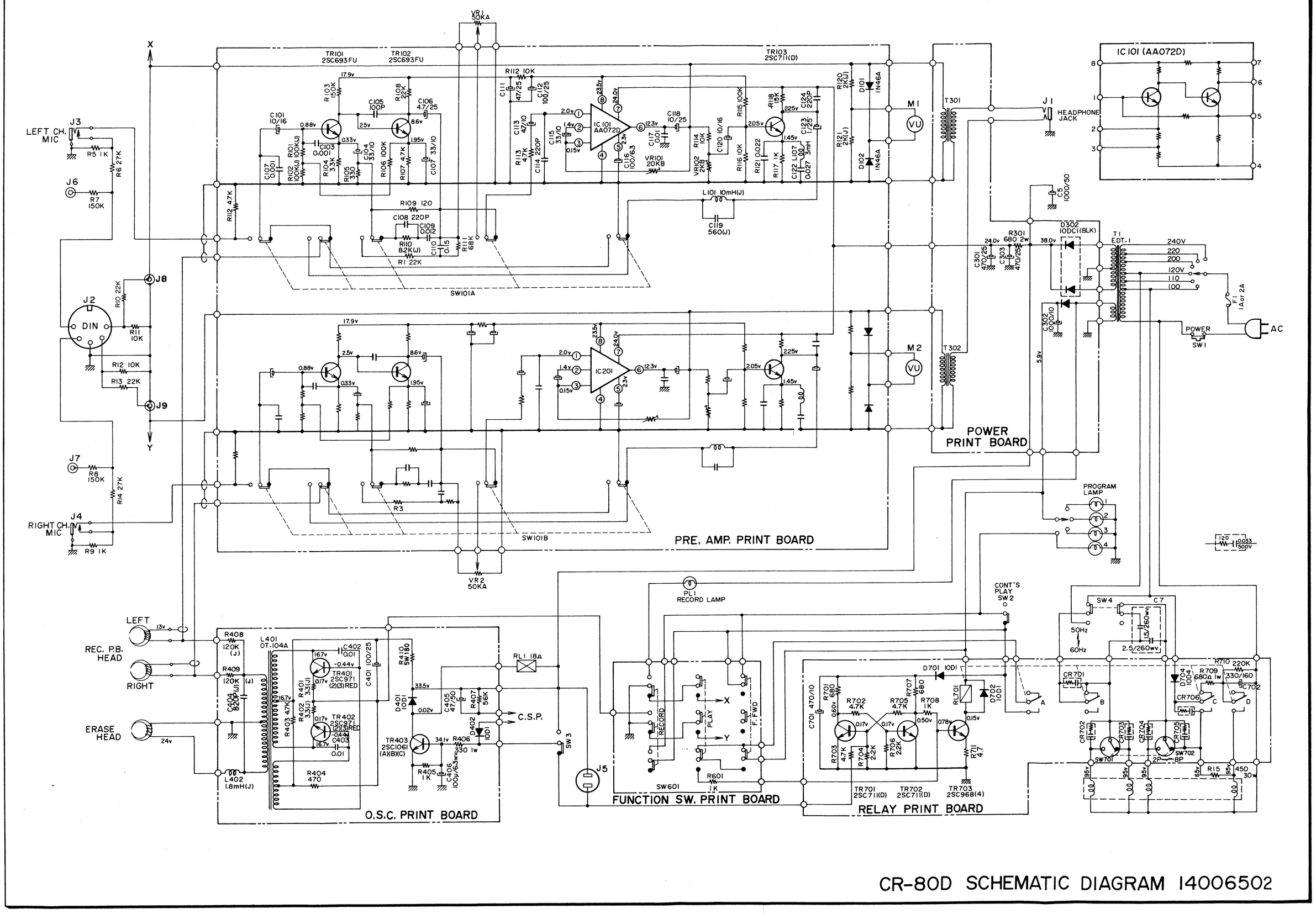
MAIN AMP. BLOCK (LEFT)

POWER PRINT BOARD

O.S.C. PRINT BOARD

FUNCTION SW. PRINT BOARD

RELAY PRINT BOARD



CR-80D SCHEMATIC DIAGRAM 14006502